Thresholds for Key Geologic Processes in the Ecosystem

There are numerous concepts of earth surface processes that are valuable to the land manager, however, there is one in particular worth mentioning, the concept of thresholds. It is especially important because it can greatly influence where we place our need for further information, monitoring and study. When considering the maintenance of a healthy ecosystem, the passage of any number of components of that system across a threshold may irreversibly affect the system. In this instance, a geologic system, landform or feature could reach a point where drastic change occurs. Geomorphic thresholds were defined initially as the condition at which there is significant landform change without a change of external controls, such as, base level, climate and land use. (Schumn, 1979). The definition has been expanded to include abrupt landform change resulting from progressive change of external controls. For example, in a geologic system, such as a stream channel, a change in runoff conditions may not always produce slow, continuous change, a threshold or failure point may be reached, and a short period of drastic change may occur.

Park management may want to have scientists identify these thresholds for key geologic processes in the ecosystem(s). Perhaps a monitoring project could be implemented to identify trends that take these processes in the direction of thresholds.

The concept of thresholds melds nicely with the NPS General Management Plan (GMP) process. The Visitor Experience and Resource Protection (VERP) scheme is now part of the GMP and it specifically requires the planing team to assess the Limits of Acceptable Change (LAC) to park resources based on standards. LAC incorporates the assessment of carrying capacity of visitors and sustainability of the resources.